

R E P O R T R E S U M E S

ED 013 800

SP 001 317

PROFESSIONAL INTEGRATION AND CLINICAL RESEARCH.
BY- WARD, TED W.

PUB DATE 66

EDRS PRICE MF-10.25 HC-\$1.20 30P.

DESCRIPTORS- *BEHAVIOR PATTERNS, BEHAVIOR THEORIES, BIBLIOGRAPHIES, CLASSROOM ENVIRONMENT, *DECISION MAKING SKILLS, *EDUCATIONAL RESEARCH, EDUCATIONAL STRATEGIES, INSTRUCTIONAL DESIGN, *LEARNING THEORIES, SIMULATION, TEACHER EDUCATION, TEACHING METHODS, *TEACHING MODELS,

THE RATIONALE OF A CLINICAL APPROACH TO RESEARCH ON TEACHER BEHAVIOR IS SET FORTH TOGETHER WITH INDICATION OF DIFFICULTIES. IN ONE CLINICAL STUDY, RECORDS OF FOCUSED OBSERVATIONS OF TEACHER BEHAVIOR WERE REVIEWED BY A SPECIALIST IN LEARNING AND A SPECIALIST IN SOCIAL PSYCHOLOGY IN RELATION TO RESEARCH FROM THESE FIELDS. TEACHER DECISIONS PROVED CONSONANT WITH THAT EVIDENCE--HOWEVER, RESEARCH WAS FOUND ON LESS THAN HALF OF THE BEHAVIORS DESCRIBED. THE CONCEPTION OF TEACHING AS A COMPLEX OF DECISION MAKING IS BEING EXPLORED, WITH SELF-REPORT DATA FROM THE TEACHER WHO WAS OBSERVED. AN INSTRUCTIONAL PROBLEM SIMULATOR IS IN DEVELOPMENT USING SMALL-SCALE INSTRUCTIONAL DECISIONS FOR CONFRONTING FUTURE TEACHERS. THIS APPROACH TO TEACHER EDUCATION WILL PREVENT STUDENTS IN EARLY COURSES FROM FEELING A LACK OF REALITY. FIVE ASSUMPTIONS OF BEHAVIORAL THEORY INCLUDE--(1) (A) TEACHING IS A PROCESS IN WHICH ONE PERSON'S BEHAVIOR INDUCES CHANGE IN ANOTHER. (1) (B) TEACHING IS A GENERALIZED SET OF BEHAVIORS WHICH CAN BE EXAMINED AND EXPLAINED IN TERMS OF A GENERAL THEORY OF HUMAN BEHAVIOR. (2) TEACHER BEHAVIOR IS THE SINGULAR MODE OF EXPRESSING THE COMPOSITE OF BELIEFS, KNOWLEDGE, ATTITUDES, PERCEPTIONS AND ASPIRATIONS WHICH CONSTITUTE TEACHING IN ANY GIVEN SITUATION. (3) TEACHER BEHAVIOR CAN BE VIEWED AS BEING COMPRISED OF (A) RATIONAL ACTS, AND (B) NONRATIONAL ACTS. PAPER REPRINTED FROM RATHS, JAMES AND LEEPER, ROBERT R. (EDS.) "THE SUPERVISOR--AGENT FOR CHANGE IN TEACHING," ASCD PUBLICATION, WASH., D.C. (RP)

ED013800

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Professional Integration and Clinical Research

Ted W. Ward

AS PROFESSIONAL educators in the second half of the twentieth century, we are uneasy in our sense of time. We feel an urgency to know, to understand, to solve, to innovate, to accomplish. And this should not be surprising. Our high-achieving society has identified education as the prime curator of its complex and chaotic problems. Caught in the revolution of "rising expectations," we examine the massive and diverse problems—increasing, changing and demanding as they are. And still unsure whether our tasks or our anxieties represent promise or threat, we accelerate our efforts, hoping that we are dealing with what may be the redeeming issues of our lives and world—all in a dynamic state of motion—all except time itself, that is, where there still remain only 24 hours in a day and 365 days in a year.

So population control, job training and retraining, mechanization, automation, impersonalization, social inequality, unemployability, urban decline and social chaos, clean air and pure water, and individual freedom and international assistance become problems looking to professional education for help. Yet in order to help solve these problems effectively, we must first seek solutions to our chronic problems within education.

We need, or so we are told, more research on educational issues, more planning by colleges and universities, more master planning by states, and better allocation of resources at the national level. Schools should be run more economically and universities should be more productive. They must be larger, yet not lose track of individuals. Educational research is to focus more on real problems and to carry the results through developmental stages to the point of service and action. And we must do this in the face of a severe drain on competent personnel.

New information must continue to grow in amount and availability. We are reminded of school dropouts and that we need superior instruction for superior students and better programs for the handicapped and disadvantaged. Teacher education programs must be expanded and improved as the teacher shortage increases again. So one could continue. Our literature is full of it: problems, problems, a few ideas—fewer solutions. At all levels, everywhere, there is to be better planning, more innovation, improved organization, greater efficiency—and education in the United States will be in good shape to solve the problems of our age.

Small wonder we have self-doubts and suffer anxious moments. Small wonder we are uneasy in our sense of time.

Lest the reader get the impression that I am building on pessimism, I warn him now of my optimism. I find the shift of responsibility to education in a real sense a triumph. Too long our society has failed to recognize that only a strong and vital educational system can give us handholds to a better future.

What is needed, however, is more than an acceptance and willingness to tackle some of these problems. And what is needed is more than inspiring statements and conventional exhortations about the magnitude of the problems and the need for vision and creative innovation. This is not to deny the necessity for creative solutions, for these are indeed urgently needed. Yet what is required, it seems to me, are explicit suggestions and descriptions about where and how we ought to direct ourselves so that we can maximize our effectiveness and minimize our inhibiting anxieties.

Where, then, might we turn for direction? What sort of creativity will be adequate to surmount the amalgam of challenges with power and vision?

We are reminded at every turn that scientific and technical knowledge has given us unprecedented opportunity to better understand, explain and predict the unknowns in our environment. Yet I fear that although we have new and more useful tools, these tools alone will not provide the creative solutions that are needed.

Gyorgy Kepes (6), Professor of Visual Design and Architecture at the Massachusetts Institute of Technology, has defined the problem well; as the artist among the scientists and as the prophet among the pragmatists, he writes:

Science has opened up immense new vistas, but we shrink from accepting the deeper and richer sense of life uniquely inherent in the new parameters of our twentieth-century world. Where our age falls short is in the harmonizing of our outer and our inner wealth. We lack the depth of feeling and the range of sensi-

bility needed to retain the riches that science and techniques have brought within our grasp.¹

He suggests that what is most needed are models that will "guide us to re-form our formless world." He identifies three aspects that contribute to the formlessness of our present life—our environmental chaos, our social chaos, and our inner chaos. He sets three basic tasks before us:

First of all we must build bridges between man and nature—construct a physical environment which is on a truly twentieth-century standard. Second, we must build bridges between man and man—create a new scale of social structure built from progressive common purposes. We must establish a sense of belonging, of interdependence, in order to achieve the teamwork that the first task demands. And, finally, we have to build bridges inside ourselves. Only if each individual can unify himself, so that one aspect of his life will not intercept and cancel another, can we hope to tackle the second task efficiently. . . .

The building of these bridges—the reintegration of all aspects of our life through twentieth-century knowledge and power—is our great contemporary challenge, and in this work the imaginative power of creative vision coupled with sensibilities can have a central role.²

Once again our plea for creative vision is heard. But here Professor Kepes goes beyond the conventional advice. He suggests a starting point. He suggests, and wisely so, that since we are seeking new visions of life, the artist possesses fundamental values which contribute to our visions:

. . . we respond to the images of artists because of their completeness; because their harmonies, rhythms, colors, and shapes touch us, and not just on one level or another of our being. . . . Art bids us touch and taste and hear and see the world. . . .

In its aspect of many-layered but unified experience, participation in a work of art often provides us with deep insight into the wholeness of the world.³

The other basic value that an authentic creative work of art offers to us is inherent in the proportion between its fundamental opposites: expressive vitality and formal order.

What makes a great painting far more than a well-ordered arrangement of colored surfaces, far more than an explosion of emotion, is its balanced proportioning of intense expression and disciplined structure.⁴

¹ Gyorgy Kepes. "Where Is Science Taking Us?" *Saturday Review*, March 5, 1966, p. 66. Reproduced from the Science and Humanity Supplement of *Saturday Review*.

² *Ibid.*

³ *Ibid.*

⁴ *Ibid.*, p. 67.

How, you might ask, does this give us direction to our needed creative solutions? At what points is this advice relevant or how can it be transferred to educational problems?

Let me seek an answer by suggesting a means of incorporating the first value of the artist—completeness, wholeness. Perhaps there is a way of looking at the conglomerate of educational pursuits that will allow us to view it in its totality—a way of seeing our diverse concerns as part of a single community of thought and feeling.

To begin, we must get outside the confines of education and consider social enterprise at large. To see ourselves, and most important, to open our eyes to new viewpoints on ourselves in relation to other elements of our social order, we must occasionally back off; we must face up to the provincialisms which we have helped to build.

An Integrating View of Education

In modern society, every social enterprise which encompasses vocational activities is comprised of three essential components: practitioners, practitioner trainers, and researchers. These elements are introduced in Figure 1.

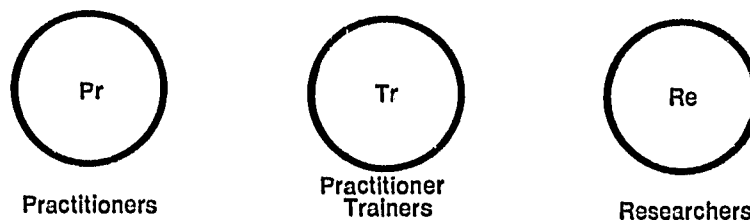


Figure 1. Elements of the Paradigm of Modern Social Enterprise

For sure, enterprises vary widely in terms of the degree of emphasis and the degree of development among the three components. In small business operations, for example, the practitioner (output worker) is almost a sole component, but not quite. In vocational schools, the function of trainer is in dominance. In consulting research organizations, the research component is predominant. Yet in each case, an elemental representation from all three components—practice, training, and research—can be identified. Typically in large corporations, business concerns, government agencies, even universities, the three components are well represented and fairly easy to distinguish.

The question of administration and supervision arises here. There is clearly a presence of administration and supervision in each of the components. These adjunct functions are assumed to exist in two relationships to each of the three components: (a) in the sense of overall admin-

istration and coordination *among* the three components, and (b) in the sense of enabling and monitoring acts *within* a given component.

Supervision, as an adjunct function, also presents another problem. In some enterprises, supervision is directly concerned with improvement of the operations and improvement of the personnel within the component, whether practitioners, trainers or researchers. In this sense, the supervision activity can be thought of as an extension of the training component, even when it operates apart from the identifiable, primary-training component. For example, the training component denoted when applying this paradigm to education is primarily the teacher education institution personnel. Yet inasmuch as school district supervisory personnel are often deeply involved in in-service training, the supervisory personnel are in one sense enhancers of the practitioner component and in another sense they are participants in the trainer component. By abstracting key elements and their relationships from a given situation, a paradigm facilitates communication about those aspects of the situation that are of interest. A paradigm loses its communication value if it tries to represent every aspect of a situation.

The basic problem of our paradigm is what to do with the supervisor—is he a part of the practitioner realm, part of the trainer realm, or a part of both? The resolution we make, for purposes of this paper, is reasonably functional. We see the school supervisor primarily as a functionary of the practitioner component, never forgetting, however, that he is most effective when operating as an extension of the training component. This resolution reduces ambiguity; nevertheless, it must be remembered that each of the three components has its own administrative and supervisory functionaries.

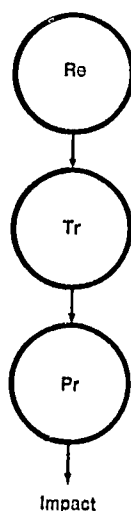


Figure 2. Paradigm I: Components in the Configuration of a Nonprofessional Enterprise

Paradigm I (Figure 2) shows the three essential components in a relationship which exists typically in a nonprofessional enterprise. This relationship is characterized by a hierarchy of authority and a communication flow that is essentially one-way. Again, bear in mind that an administrative structure external to the three components ties them together to a focus on given tasks. For example, market research dictates what salesman training will seek to achieve in salesman (practitioner) activity. Salesman activity, in turn, achieves the sales objectives determined by management. Thus, management is the external binding force which commits all components to a given task to which the components make a ritualistic sequence of contributions.

In a professional field, these same three components exist, but they appear in a different configuration. They may not be more evenly balanced than in the nonprofessional enterprise, but there is a very important difference: in a well-developed profession, the communication flow is two-way and mutual. No component can insulate the other components from each other. Paradigm II (Figure 3) is a representation of the same three components but in a different configuration and tied together by additional communication lines.

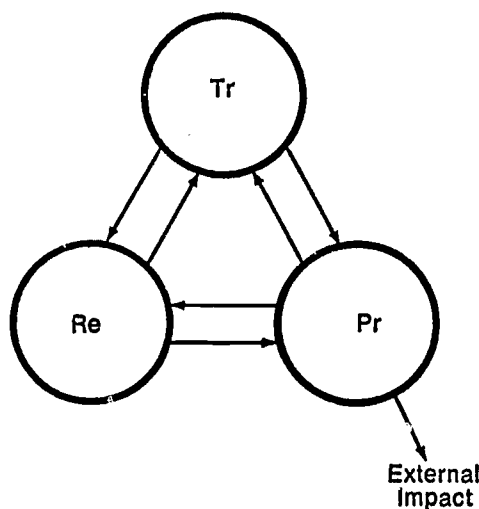


Figure 3. Paradigm II: Components in the Configuration of a Profession

For sure, this is not meant to imply that the only distinguishing criteria of a profession are the patterns of communication and the absence of a hierarchy of dictation among the essential components, but only at this point to illustrate these particular differences and to pursue the differences to illustrate how to transform Paradigm I into Paradigm II.

We can think of education or any other social institution as a triad,

a whole unit comprised of three components, each possessing specialties, commitments and vitality in its own right. A sense of unity is basic to wholeness.

Attaining a sense of unity alone is hardly adequate, however, and so we must examine the second value of the artist—a well-balanced proportion between expressive vitality and formal order. This second criterion for artistic expression is hardly visible in education at this point in time. I would also suggest that this task is the more crucial and also the most difficult to achieve.

Intense expression is now found within each of the three components of the educational enterprise; but formal order, vitally necessary to proportion, is lacking. The triad as a whole does not possess an organized life. Thus, the lack of a structured discipline hinders the search for creative solutions. These are reasons to believe that education has not yet become a profession. Further, there are clearly cases in education where the hierarchical linear flow and lack of inter-component feedback characterize our activities. It would be useful to consider what might happen if we were deliberately to add the missing communication links to our enterprise to achieve the status of Paradigm II. Hopefully, these communication links could develop from efforts to get the needed structure and, in turn, contribute to the maintenance of the structure. Figure 4 presents the two sets of communication additions which can be thought of as transformations implicit in changing Paradigm I to Paradigm II.

The concern for communication flow in the educational enterprise is not new. Many attempts have been made to conceptualize the com-

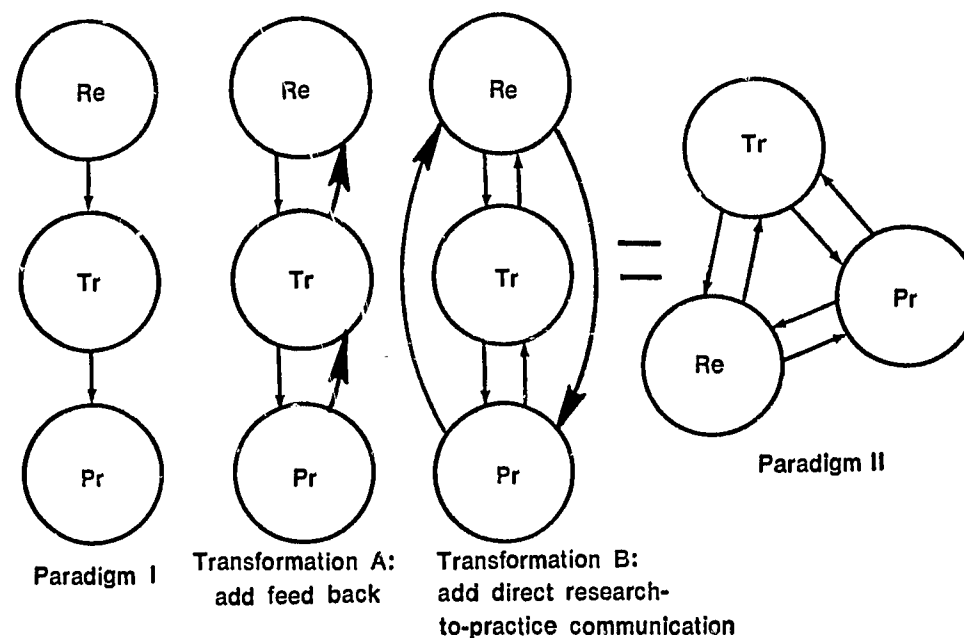


Figure 4. Transforming Paradigm I to Paradigm II

munication problem and various procedures to solve the problem have been employed. The procedures which are represented in Figure 4 as *Transformation A* have been reasonably successful. Very likely the relative success is attributable to the fact that the trainer-to-researcher (*Tr* to *Re*) communication feedback can be accomplished within the confines of a single institution, the university, and the practitioner-to-trainer (*Pr* to *Tr*) feedback can similarly be effected in the single domain created by the newer approaches to teacher education in which practitioners are regarded as essential partners in the internship operation. But *Transformation B* encounters much more resistance.

Numerous and commendable attempts to get the research component into interaction with the practitioner component have been made over the past quarter-century. Hardly a journal today fails to include a regular column, "From the Researchers." The American Educational Research Association is represented by the series, "What Research Says to the Teacher." Yet I can find little effort in the other direction: what the teacher says to researchers! Clearly the problem has not been solved by the tactic of restating research findings in simpler language. In a sense, language is the problem, but not in the senses of the lack of translation or of over-complexity.

The basic problem is far deeper: research is scientific inquiry and as such is concerned with careful description in a precisely meaningful vocabulary. Teaching practice is an area of human endeavor not yet well described in any precisely meaningful vocabulary. Thus, all attempts to get researchers and practitioners "together" are doomed to failure until research in the problem of defining and qualifying *teaching* has produced a precise vocabulary and certain elemental predictable relationships among variables. It is small wonder that "what we know about learning" is so limited and so difficult to employ in practice.

One important effort to relate research to practice has been the action research movement. Borrowing heavily from propositions of Kurt Lewin (7) and his students, Stephen Corey (3) and others in education have forged a concept of problem-solving research which has been promoted as a means to bridge the gap. Whether or not the action research movement has yet demonstrated a capacity to bring the work of researchers and practitioners into interactive communication is debatable. For the purpose of this paper, it is sufficient to state that there is inadequate empirical evidence that teachers are better teachers after completing action research projects or that a researching teacher serves as a model of inquiring behavior for pupils. The latter seems quite promising but awaits testing.

A more important observation for this paper is that action research quickly fell into disrepute among the researchers in education. Rather than bridging the gap, action research seems to have made it wider. Clearly the answer does not lie in having practitioners pretend to be researchers, nor does it lie in the opposite extreme of expecting researchers to take all the initiative in relating themselves to practitioner problems. Ernest Hilgard (5) reflects the bias of the researcher:

At any one time, scientists in experimental and theoretical fields can work only on the problems upon which they are prepared to work with the conceptual and material tools at hand. These may or may not be appropriate to the practical problem calling for solution.⁵

The research described later in the paper is to some degree a by-product of action research. We are translating even a larger application of Kurt Lewin's concept into education. Action research takes the position that better solutions to educational problems can be found through studies directed at the practitioners' decision-making tasks. Thus, we are developing studies which focus on practitioner behavior in such a way as to produce potent interaction with the training component and the basic research component of the professional triad. Because of the focus on the practitioner and his client-centered problems, we call these studies *clinical research*. Here we find a fundamental hope for creating meaningful interdependence among the components in the triad.

Intensive study of the practitioner's instructional tasks and instructional management problems designed to bring order to the profession is different from an "action research" concept wherein the goal is the getting of a transitory and highly pragmatic basis for an action decision. In clinical research, we apply the efforts of highly trained behavioral scientists to research *with* practitioners—first to develop descriptions of the real world in which their client-contact tasks exist, then to describe the variables the practitioners manipulate and the effects these manipulations produce, and finally, to so precisely define the vocabulary of the descriptions that corollary statements from basic research can be reliably identified and constructively related to applied problems.

This is not a new idea but attempts to actualize it have been rare. The current studies of instruction, as in the work of Bellack, Fattu, Flanders, Hughes, Smith, Taba, and Turner, to name a few, can be thought of as pioneering efforts in clinical research. The studies at Michigan State University are in this growing tradition, but we are making a somewhat different emphasis in that we see the clinical studies as but

⁵ Ernest R. Hilgard. *Theories of Learning*, Second edition. New York: Appleton-Century-Crofts, Inc., 1956. p. 489.

a step in the process of more adequately relating the practitioner component to the research component, as well as to a vitalized teacher education component.

The old argument of basic research versus applied research is being put to rest by responsible behavioral scientists. Ernest Hilgard (5) helps to reduce the presumed dichotomy in the following statement:

Because scientists have to develop appropriate methods and concepts before their results can become efficient regulators of practice, their concerns for a time may appear to be remote from practical affairs, and some of their disputes will seem to be quibbles over distinctions that do not matter. All this suggests the need for patience and tolerance toward experimentation which pushes back the boundaries of the known and toward theory construction which attempts to sharpen the conceptual tools with which scientists can work.⁶

The activities subsumed in clinical research promise to help with the sharpening of conceptual tools to which Hilgard refers. It makes little sense to argue whether basic research is "better" or even "more useful" than applied research. Good research is good for certain reasons and these reasons are the same whether the problem is highly operational or abstract. Yet it is sensible to argue that research in any field will have impact on the practice of that field only to the extent that the field's real problems are known and adequately described.

Basic research is often plagued with the problem of external validity. Applied studies are inherently weak in internal validity. Clinical research offers a hope for resolving validity problems through careful matching of data from basic studies, as in laboratory conditions, and parallel data from field studies, where controls are less easy to maintain.

The focus on the clinical environment has proven to be productive of new data about practitioner behavior and much more. It has shown signs of enhancing all three of the communication loops in the paradigm. The clinical studies, largely because they are carried on in the practitioner environments in which the University is conducting teacher education operations, have demonstrably enhanced the practitioner-to-trainer (*Pr to Tr*) loop. Further, the practitioner-to-researcher (*Pr to Re*) loop has been affected by the data from the studies.

Our work began in 1963 as an outgrowth of conversation with a respected learning researcher. In the course of a discussion about the impasse between researchers and educational practice, he complained that although it was common enough for teacher educators to argue that teachers base their classroom activity on informal hypotheses or hunches about the learning variables, no one had ever taken the trouble either

⁶ *Ibid.*

to substantiate the proposition or to identify and compile what hunches there might be.

Recognizing the validity of the complaint, we set about to test the proposition and to seek out the informal hypotheses on which a given set of elementary teachers were acting. Our practitioners are now providing data to the researchers, and in turn, the researchers are feeding back data which they glean from the outside research. So far, these efforts are confined to a process of checking the teaching hypotheses against the research literature in social psychology and human learning. The feedback consists of information about the existence or non-existence of relevant basic studies of the same matter, and where studies do exist whether or not they are mainly supportive or mainly refutative of the particular instructional hypothesis. Thus, the intensive focus on practitioner behavior has produced an enlarging ripple effect which is stimulating all three major communication loops. This is represented in Figure 5, where the concentric rings represent the increasing impact.

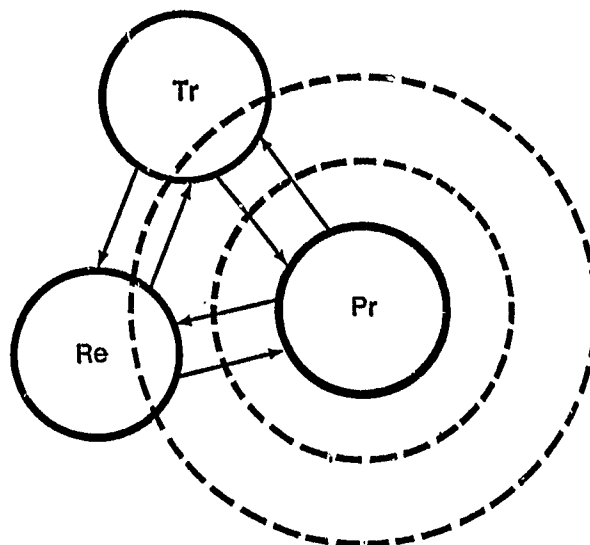


Figure 5. Impact of the Focus on Clinical Behaviors of Practitioners

But our concern is not just a matter of improving communications. What is being communicated is of vital importance. The need for form and order in education demands a concept of education as a unitary enterprise. Clearly the three components of the paradigm are held together by communication, but they are also mutually dependent—in that no one of the components makes much sense without the other two. Together they interact with the external world. Essential to the creation of form and order in human endeavor is the affixing of responsibilities. Thus, the paradigm can be elaborated to include a triangular exterior frame to represent the integrity or wholeness of the professional field and a set of input-output lines to indicate the major

interactions of the system as a whole with the outside world. These lines are located in proximity to the components most directly responsible for the given external contacts.

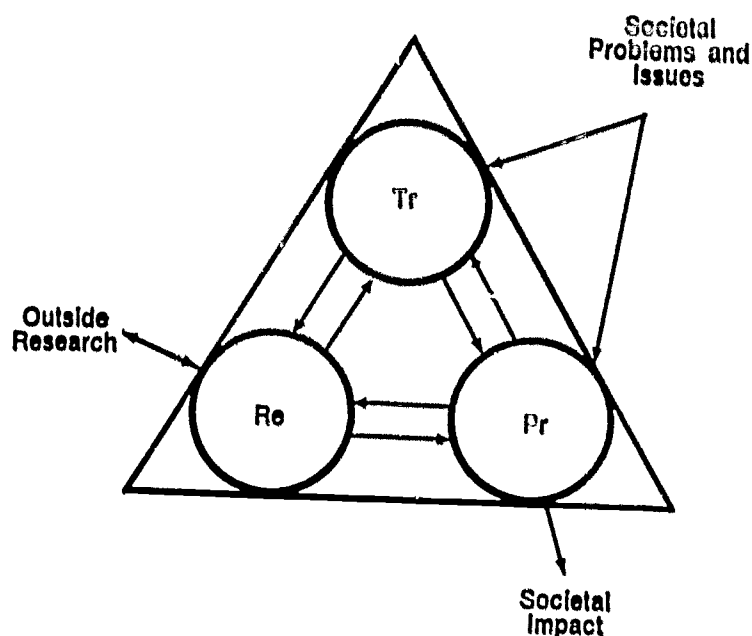


Figure 6. The Field of Education as an Interacting System

Clinical Studies as Research

Understanding the contributions and promise of clinical studies starts with a perception of clinical studies as research. Since such a perception must be built on specific illustrations, I will direct attention to the clinical studies with which I am most familiar—those which the Learning Systems Institute has designed and managed for Michigan State University's School of Teacher Education. This will highlight a number of the key elements of clinical research, particularly the following: (a) location of the data gathering in real instructional settings, (b) behavioral description of the teachers' activities within particular settings and in the course of striving for various learning objectives, (c) comparisons of data from several instructional settings in order to identify common elements and peculiar elements in sets of instructional behaviors, and (d) examination of behavioral descriptions (and the instructional hypotheses which they reflect) in the light of given bodies of outside research.

Observing Teaching

The clinical research studies to date have used decision making as the focal point for data gathering. The focus on decision making provides a

means for "getting at" the various origins of the teaching behavior described. The series of studies the Institute has conducted since 1963 has refined a procedure for using the observer's judgment of an apparent decision-making function of the teacher as a focus for descriptive observation.

The studies in this series have served two purposes: (a) to derive instructional materials for preclinical teacher education courses; and (b) to provide descriptive data on the models of teaching which operate in our various clinical centers. The Focused Observation routine which has been developed for these studies uses observer data and self-report data from the teacher to investigate a particular act (as a product of some decision-making function) as it relates to: (a) what the teacher *sees* (perceives in the situation), (b) what he *knows* (information which he relates to the situation), and (c) what he *believes* (values which direct the particular action). Descriptions of the decisions teachers make in an instructional setting have been found to provide a useful focal point for behavioral description.

A second reason for the selection of decision making as the unit of behavior to be studied is that it allows a broad range of behaviors to be described. Rather than focusing on a limited facet, (e.g., the communicative interaction between teacher and students) activities of a wide and varied nature, even those which seem trite and perhaps inconsequential, can be taken into account. The following lists illustrate that the instructional function of the teacher, when viewed as an information system (9), involves behavior activities which require continuous decision making.

<i>Input</i>	<i>Processing</i>	<i>Output</i>
Watching	Selecting	Motivating
Listening	Planning	Managing
Reading	Evaluating	Leading
		Directing
		Coordinating
		Providing
		Telling.

Third, there is a practical advantage in studying small units of behavior, as is possible through the focus on decision making: the immense scope of teaching behaviors presents frustrations to those who would seek universal generalizations. The possibility of analyzing small samples of behavior and of generating partial models allows some useful products to be derived long before the completion of exhaustive descriptions of teacher behavior. In fact, it can be argued reasonably that exhaustive descriptions and universal statements here are impossible.

Still another reason for focus on the teacher decision making within the instructional context is that this allows for descriptions that can ultimately take into account the pragmatic method of decision theory as described by Bross (1). This method includes: (a) descriptions of a problem environment, (b) a set of actions, (c) a set of outcomes associated with the actions, (d) a set of probabilities associated with the outcomes of the actions, and (e) the desirability of the outcomes.

Finally, the focus on decision making as the unit of behavior has been found to provide an effective means to procure behavioral description of the small and discrete elements of which larger descriptions, even models representing "styles" of teaching, are composed.

In the particular Focused Observation procedure used most extensively so far, the descriptions include three basic segments: (a) *situation*—a description of the relevant elements in the immediate environment, (b) *action*—an account of the particular teacher behavior cited as an action based on an apparent decision, and (c) *consequence*—a description of the consequences of the action in terms of the immediate environment. After the observer writes these materials, the teacher is asked independently to verify what was seen and reported by the observer and to make any relevant additions he feels are important. In some cases, this interview is tape recorded. If there is fundamental disagreement between the observer and the teacher as to what occurred, the observation data are regarded as unreliable.

Both observer data and self-reported data are necessary. First, data that have been reported only by an observer or a teacher are less reliable than data obtained independently from both sources and then compared for consistency. Second, the adequate analysis of the situation and consequences usually depends upon data not available to the observer. In addition, the self-reported data and the way in which the teacher responds to inquiry are necessary in order to assess rationality.

Assessment of the rationality in teacher actions is one of the important problems in the present clinical studies. The Focused Observation procedure assumes that a degree of rationality exists in the sort of teacher action which the observer can describe as following relevant environmental cues. Indeed, much of the usefulness of the procedure is based upon the assumption that the instructional decision is a focal point revealing, in behavioral terms, what the teacher knows, sees and believes.

A diagram of the assumed relationship between a behavior and its roots is given in Figure 7.

Figure 7 illustrates the analysis problem: not all behavior is rooted in rational connections between what one knows, sees and believes. Before

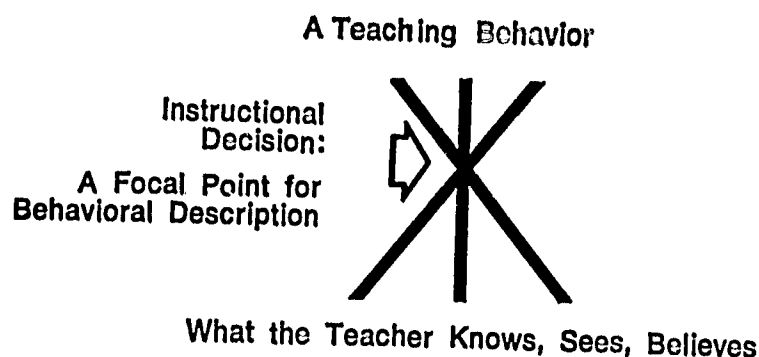


Figure 7. Diagram of the Teacher's Instructional Decision as a Focal Point

other analyses can be made, it is necessary to make a distinction between what is and what is not rational behavior. Until we study the problem further, we are describing *rational* behavior as an action (or a deliberate non-action) preceded by thought which relates environmental cues to the selection of the action. Once rational decisions are identified, their roots can be traced. What the teacher has related to the problem can be investigated; this can be accomplished by inquiry into what he saw in the situation, what pertinent knowledge he related to the problem and what he believes to be worthy outcomes from the decision he made.

Compiling Models

In the clinical studies at Michigan State University, models of teacher behavior are constructed from the collected descriptions of teacher behavior. The term "model" has been associated with educational theorizing for more than a decade (2). Maccia (8) says that models fall into two categories: object model and characterization model. She discusses the two categories as follows:

Since there are objects and there are characterizations of them, the twofold distinction arises. If the characterization is about actually existing objects, then it is empirical. Our interest centers about empirical characterizations, for educational theorizing is an attempt to characterize actually existing objects falling within the domain of the educative process. In an empirical characterization, the statements not only express the nature of the objects, but also the way in which the objects are interrelated.⁷

Maccia also suggests that there are two uses for models:

In the first use, the object or characterization is a *model* of whatever is being represented; and in the second use, the object or characterization is a *model* for

⁷ Elizabeth Steiner Maccia. "The Conceptions of Model in Educational Theorizing." *Occasional Paper 62-114 Cooperative Research Project 1632*, U.S. Department of Health, Education, and Welfare. Columbus, Ohio: Ohio State University Research Foundation, 1963. p. 47.

whatever it is represented in. A *model of* would be a representational model, while a *model for* would be a non-representational model.⁸

Using Maccia's definitions then, it can be said that the models derived in the clinical studies are empirical characterization models. They are intended, however, for both purposes—as models *of* teacher behavior (as in behavioral descriptions) and, after certain comparisons and modifications, as models *for* teacher behavior (as in theory building).

The particular set of teachers whose instructional behaviors are to be modeled are known as a "referent group." Such a group is convened to review the collection of some 200-250 descriptions of instructional decisions which were made in their own classrooms. They are asked to select those descriptions from the data pool which reflect behaviors they are presently encouraging in their interns. An arbitrary positive agreement level of 80 percent of the referent group is required on two questions in order to qualify a description for inclusion in the model being compiled. The two questions are: (a) Is the description adequate to provide a useful mental picture of the situation? and (b) Is the teacher action (or non-action) appropriate as you see "good teaching"? A third judgment concerns a rating of the representativeness of the occurrence of the described situation in classroom teaching at this level.

These three judgments are made independently by all members of a referent group. After those descriptions which are rejected by more than 20 percent of the group (on the first two questions) have been removed from consideration, the remainder are categorized and become the model for that group. The referent group is asked, as a final step, to arrive at an acceptable statement of an operating hypothesis which adequately expresses the basis for each behavior in the model.

After final editing and hypothesis verification, the result is a collection of about 125 to 200 behavioral descriptions, organized in terms of the particular instructional problem to which each description relates.

Comparisons Among Models

One of the more immediately interesting outcomes of these studies is the capability of comparing models of instructional behavior as it exists in differing situations. Our analyses of such comparisons are just beginning now, and, as yet, there are no data to report. We have under way a study of highly competent "center-city" elementary teachers in Detroit, Grand Rapids, and Flint. The descriptions in the model from this referent group are to be compared with the models derived from three other

⁸ *Ibid.*, p. 48-49.

groups of outstanding elementary teachers (whose teaching assignments are not in "center-city"). Thus, we hope to get some clues about any behavioral differences which may distinguish the successful teachers in the urban center from the successful teachers in more ordinary locations.

The analysis procedure consists of: (a) inspecting two or three models to identify behaviors which are common to both, and which are peculiar to each; (b) verifying the inspections by reconvening the referent groups to consider whether behaviors which are not found in their respective models are a result of chance or of real exclusion; (c) adding into each model those descriptions which each referent group agrees also properly belong within their behavior model; and (d) re-inspecting the models for common and peculiar behaviors.

The procedure can be described as a comparison of intersecting sets where the identification of elements common to two sets must take into account the likelihood that elements which appear to be exclusive in one set may be a product of chance. A generalized paradigm (Figure 8) illustrates the procedure:

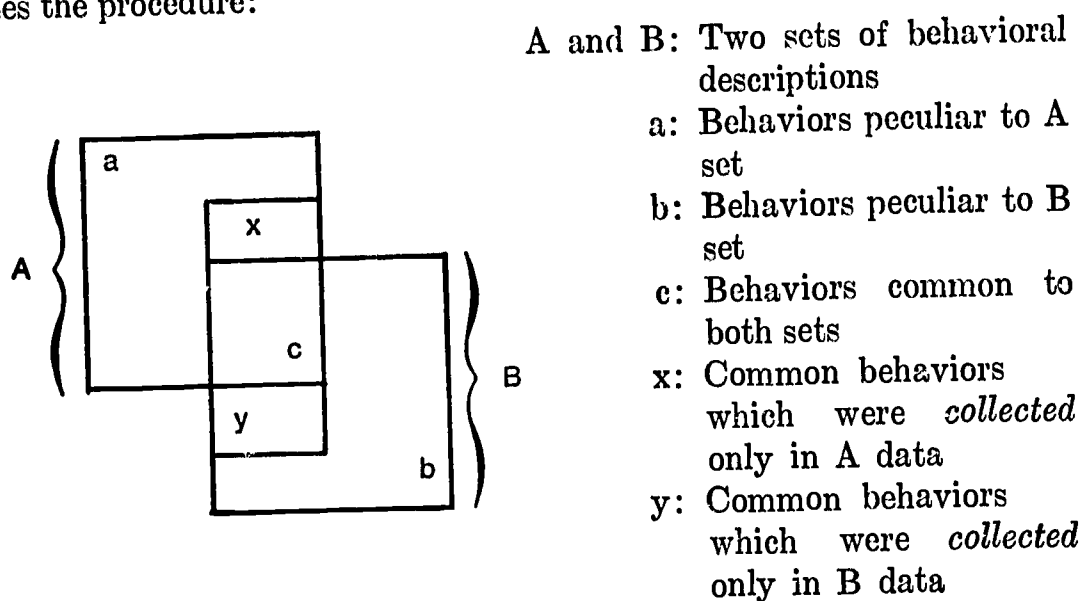


Figure 8. Paradigm Illustrating the Comparison of Sets of Behavior Samples in Two Models

The fruitfulness of this kind of comparison activity will enable us to determine the usefulness of model derivation as a research tool. At the same time, it provides for increased focus and relevance of selection of training experiences as we prepare teachers for the particular tasks toward which they are aspiring.

Other comparisons that can be made in further studies would include:

1. Models of teacher behavior derived from middle-class neighbor-

hoods compared with those derived from culturally-deprived neighborhoods

2. Statements about teacher role and behavior which students encounter in preclinical coursework in education compared with models encountered in field experiences

3. Models of teacher behavior in elementary teaching compared with models of secondary teaching

4. Models of teacher behavior in selected fields of special education teaching compared with models of elementary and secondary teaching

5. Comparisons of models of behavior operating in various secondary school subjects

6. Models based on different concepts of "good" and "bad" teaching.

At present, we lack precise definitions upon which to base the crucial distinction between "general" and "special" in educational methods; much confusion in teacher education and in teacher evaluation can be traced to this lack.

Checking Instructional Behavior Against Outside Research

Although we see this step as a vital contribution of the clinical studies, to date we have only run the outside research checks on one set of behavioral descriptions. But the general findings are useful to report here. In the particular study, there were 210 Focused Observations in the starting data pool. Of these, 143 passed the screening and became elements in the model of elementary level teaching behavior.

The 143 descriptions were then given to a research team—one person in learning and the other person in social psychology. Their charge was to note any teacher decision which did not square with the evidence from research. They had no power to delete—only to challenge—since it was possible that they might be wrong about the classroom application of evidence from laboratory sources. Their obligation after challenging a teacher decision was to write a critique in which they reviewed the research which suggests a particular change in the operating hypothesis. They also had to suggest an alternative behavior which would be more in agreement with research. Of the 143 decisions, only four were challenged by the researchers. Perhaps more significant was their observation that specific research evidence spoke to less than half of the behaviors described. Thus, we have demonstrated, at least in this set of samples, that teaching is not wildly out of harmony with the basic research that can be meaningfully related to the teaching tasks.

Summary of the Research Contributions of the Clinical Studies

There are three groups of outcomes toward which our clinical studies have been moving. The first group is concerned with refined procedural techniques for documenting, analyzing and compiling teacher behavior samples. The second group accompanies the first as a contribution to educational theory: a set of statements concerning the function of general and special behaviors as they can be shown to relate to particular elements of environment or learner characteristics. The third class of outcomes is the most promising: the merger of data from behavioral studies in education with precise outcome statements from outside research. This may prove to be a useful new approach to bridging the gap between research and practice in education, first, in the sense of more adequate use of outside research by the education profession and, second, in the sense of stimulating research which will focus more adequately on basic problems of educational practice.

Relating Clinical Research to Teacher Education

Behavioral science is coming of age, and we are recognizing that a well-ordered educational profession will be based upon behavioral science approaches. Behavioral research in the problems of human learning and in the practice of instruction is a rapidly expanding field. Clinical studies of learning and teaching are carried on as a fundamental part of the environment in which teachers receive their practical training; thus, they afford an added dimension for the training experience itself. Since clinical research is less threatening to practitioners than abstract and remote laboratory research, trainees and supervisors are able to comprehend and utilize the findings. Further, they are more able to contribute and recognize the value of their contributions. Clinical research is concerned with the very problems which practitioners identify; furthermore, it begins with descriptions in the real environments, not just in the highly controlled and contrived environments of the laboratory. Like teaching itself, clinical research faces up to the ever-present problem of complexity—solutions are rarely generalizable without many provisions about the wide array of confounding variables.

Clinical research uses an essentially positive orientation. Studies of teaching implicitly acknowledge that what experience has taught practitioners is worth knowing. There is plenty that is right about teaching today; plenty to build upon. Alert practitioners who grow along with the demands of their duties are a powerful resource. We do well to build

teacher education programs upon the models of excellent teaching which exist in a large number of public school classrooms.

Yet we have much to learn in order to be able to improve preservice and in-service education and to make supervision more effective. We do not even have highly developed data sources about needed change. In the absence of better data, we can treat the complaints which constitute the day-to-day counseling problems as informal feedback. This source is readily available. I have noted two major criticisms of the preclinical courses: lack of reality and lack of definiteness.

The student often tells us that his preclinical courses lack a sense of immediacy and reality. He wonders if what he is expected to learn is really giving him a true picture of teaching. He seems unconvinced that there is anything he can learn in these courses which will make much difference in his future as a teacher. And he hears other people, even respected professors and school teachers, who reinforce his suspicion. He begins to suspect that there are people in the teacher education program who have been passed over by progress—people whose concepts about what teaching is all about, what the schools are like, and what children are like, are concepts from yesterday.

And we have to wonder about relevance. Do our students learn the knowledge and skills they will actually need? How well does the teacher education program agree with what the student finds when he gets into his own first teaching position? We like to believe that colleges which provide much of the teacher education experience right in the real environment of the public school are less prone to this criticism. Yet, we still hear the criticism that what comes before the student teaching or internship has little apparent relationship to the demands of real classroom teaching. Many students report that the pre-student teaching work does not have the kind of relevance that would make the most sense. Some find that teaching does not look like they thought it would look. Part of this problem is related to the fact that a student has a notion of teaching largely produced by his own past experience as a learner through long years of elementary, secondary and college education. We lack imaginative ways to help him make the shift from student to teacher.

The lack of definiteness is even more difficult to cope with. Experienced teachers know full well that few magic formulas exist. Teaching requires a quick-thinking, imaginative response to a kaleidoscopic array of problems and needs. There is truth in our complaint that every situation is different. So we might want to shrug off the criticism of fuzziness in teacher education—we are tempted to argue that it must be indefinite and vague. To get any workable solutions to the vagueness problem,

research must be called in. Few careful studies of the behaviors of competent teaching exist. There has been a steady flow of interesting research on teacher attitudes, teacher personality, and other psychological investigations of teachers and learners; but descriptive pictures of what good teachers *do* in particular settings are scarce.

Clinical studies can fill this void. For sure, attitudes and personalities are important, but basic traits and personality attributes are almost hopelessly resistant to improvement efforts. On the other hand, role perceptions do shift, behavior styles and actions are picked up from the models which exist in training or employment. It is especially clear that the supervising teacher in the student teaching experience is a powerful behavior model. We need descriptive research in order to get a better picture of what these behavior models look like; this will be the basis for developing materials and experiences in the preclinical phases of teacher education which will communicate these models more rapidly to the teacher-in-training. We expect this approach to provide a definiteness which seems now to be lacking. Teacher education can become a set of experiences which enable the student to begin to operate within the framework of the best teaching models available in real practice.

Models of teaching exist now, and certainly their impact is communicated—imprinted—on newcomers to teaching. Yet most models are largely implicit and their communication is now unsystematic. If the presently operating implicit models of teacher behavior could be made explicit, this would allow for more orderly approaches in teacher education, since the objectives of teacher behavior would be more visible and more susceptible to evaluation. When the components and objectives of teacher behavior are made more visible, the design of preclinical experiences can be more consistent with clinical experiences. Systematic revision can be initiated to experimentally modify teacher behaviors which are found to be inconsistent with outside evidence.

High-Efficiency Training Devices

Development of high-efficiency training materials and devices in teacher education awaits an adequate base of behavioral research of educational practice. Outstanding use of training-problem simulators and other high-efficiency training devices has been made in several fields, notably aviation, navigation, and space science. It is significant that the fields most ready and able to develop high-efficiency training procedures are those fields already characterized by a high degree of behavioral research on practitioner tasks.

An outgrowth of the Michigan State University clinical studies is a

project in simulator technology for teacher education. In the development of our first instructional problem simulator, we have reduced teacher behavior to one common behavioral element: instructional decision making. And now we are inventing ways to confront students with small-scale instructional decisions, in order to give them practice in thinking as a teacher must.

We hypothesize that if the student can learn to seek and select environmental data and to base his instructional decisions on the important characteristics of the problem situation, he will develop a versatile and useful teaching skill. He will begin to adopt a systematic habit of using observations about what is in planning his teaching moves and evaluating the outcomes of his actions. Thus, he can profit from success *and* failure. Exciting possibilities are opened up to us once we commit ourselves to a crisp definition of the basic behaviors we want in professional practice.

Methodology as Hypotheses

In order to use high-efficiency methods, learning tasks must be highly specified. A behavioral theory of teaching can generate suitable specifics. It is useful to think of the teacher as a data processor—receiving from the immediate environment information which is to be processed within the framework of the stored data about objectives, procedural intentions, content to be communicated, and so forth. It is reasonable to suggest that teaching the rudiments of this particular behavioral style is preferable to a teacher education which attempts to teach “principles of learning” and a methodology which students perceive as precepts.

Despite pedagogical claims that there are general principles which operate in practice, these principles remain largely untested precepts, rarely being systematically treated as hypotheses needing empirical testing and subsequent revision. Most of these so-called principles are rooted in valid psychological experimentation or sound sociological observation. The difficulty, however, seems to be related to the craving we pedagogues have for generating larger and larger statements; what begins as a small-scale generalization from careful data soon is passed on to a whole generation of teachers as a large-scale principle of learning.

Indeed, precepts and generalizations can blind us to reality. No wonder our alert students rebel when they find that what they have learned simply does not work. Failure is interpreted as fallacy in the precept or, worse yet, inadequacy in the person. How much more secure and able to grow is the teacher who sees methodology as hypotheses!

We need to get closer to data and stay there. We need to develop in

teachers not so much a knowledge of all there is to know about learning, for this is clearly impossible, but a systematic habit of basing instructional decisions upon whatever relevant data is available in the immediate environment of the classroom. Methodology can be thought of as a process in which the teacher (a) seeks cues by observing the dynamics of the classroom moment, (b) combines these cues with the aspirations and objectives he has for the learners (using his own hypothesis about learning), (c) makes a "move," and (d) evaluates the consequences of the move and the hypothesis on which he acted, in order to be able to make a better prediction next time.

Complicated though this may sound in verbal description, the human mind is capable of carrying on far more difficult cyclical processes than this one. Development of the habits of making appropriate observations, diagnoses, predictions and evaluations must be a major objective of professional education. Once established, such mental routines provide a highly flexible format for the teacher as he enters a career loaded with new and unpredictable demands.

Getting Started in Clinical Research

One of the first steps in building the Michigan State University clinical studies was the design of a basic data-gathering procedure particularly suited to the opportunities for observation and discussion presented within the social structures of the clinical and preclinical courses in teacher education. This first procedure, which has been through five basic revisions and now is widely used in two different forms, has the capability of generating descriptions of teacher actions in terms of the environmental cues and the cognitive processes of the teacher. The procedure uses observer data plus self-reported data by the teacher; the self-reported data is obtained without subjective clues and thus constitutes a basis for reliability tests of the observer's data. One form of the procedure uses tape recordings and time measurements of response latencies to produce additional data about the degree of rationality in the teacher's decisions.

When the Focused Observation procedure was developed by Southworth, Hoffman and Ward, it was hoped that other behavioral research data-gathering procedures could be as skillfully tailored to the peculiar opportunities in student teaching and internship operations. It was intended that, in time, a battery of behavioral study techniques could be borrowed, transformed and created for use in the large field of study available within teacher education.

In the past two years, we have made many observations and have come to some conclusions which can now serve as guidelines for clinical research instrument development. These we are recommending for use by our various coordinators and consultants who are interested in improving our arsenal of research instruments.

1. *The necessity of focus.* The first suggested guideline is that a behavioral study instrument suitable for research on instruction must have a precise focus. Case-study approaches in which everything available is gathered and diagnosed tend to diffuse the data and seriously inhibit meaningful analysis. A focus gives rudimentary delimitation and serves to avoid the classical problem of gathering more data than has value.

In the Focused Observation, for example, the observer uses the moment of teacher action as the focal point between the environmental data and the teacher perceptions, aspirations, objectives, knowledge and beliefs which affect the decision. Thus, the decision moment is a focus—there is something to look for, something to describe and something to discuss with the person observed. Each of the several instructional behavior studies which have come to national attention has such a focus. Developers of instruments for studying other aspects of practitioner behavior can get useful ideas about how to get suitable focus from these studies.

2. *The demand for range.* We have established that focused procedures can also have range. Research on instructional behavior is still a fairly primitive undertaking; we cannot afford premature judgments about which elements of behavior are important and which are unimportant. A common pitfall is to develop procedures which tap some area, some particular element which is logically relevant to instructional competence, and to place all subsequent effort on this area.

Perhaps it is more academically respectable to do one thing very thoroughly than to do several things only fairly well, but a danger lies in the tendency to inflate the relative importance of whatever has been selected to be done. Until empirical evidence is available about the relative importance (for particular kinds of instructional problems) among verbal interaction, question-asking strategies, patterns of instructional "moves," classroom climate, and so forth, a very broad range of investigation is needed. Building up empirical evidence that one of these classes of variables is indeed germane to instructional competence and learning achievement is an intermediate stage. To some degree, the Flanders (4) interaction analysis studies have established evidence for the importance of verbal interaction vis-à-vis classroom climate. Now is the time to correlate these studies with studies of other sets of variables in the instructional environment.

3. *The need for self-report data from the practitioner.* Any observation procedure that attempts to get a meaningful picture of what is going on in an instructional or management situation must take data from the practitioner. In the classroom, for example, the only person able to identify what particular elements of past experiences and case histories, what objectives, what environmental cues and what personal biases were operating in a given behavioral sequence is the teacher. The observer can note the actions and, to some extent, the perceptible interactions, but analysis must get behind these notations—ideally must get into the mind of the practitioner. Clearly, what the teacher knows about the basis of his action must be investigated; clearly, he should be given a role in the data gathering.

4. *Minimizing observer judgments.* Reliability, particularly inter-observer reliability, is largely dependent on the extent of observer judgment required. Even straightforward objective reporting is hard to keep free of judgments and other value decisions, but the behavioral research techniques which prove to be the most unmanageable and the most demanding of rigorous, costly training and monitoring are those in which the data gatherer is asked to be a reporter and a judge simultaneously. Reliability drops when he must categorize or qualify during the observation or interview. Developers of instruments for clinical research should pay close attention to this problem.

5. *Data gathering as educational experience.* One of the promising values of clinical research is the design and use of data-gathering procedures wherein the persons assigned to gather data are engaging in experiences which have educational value for them. Since clinical research is conceived as an adjunct of training programs within the field environments of education, such data-gathering procedures can open up a fairly large and economical set of data sources. Thousands of people at any given moment are engaged as trainees and supervisors in practicum experiences within the educational training field. These people are spending much time observing, their attention may or may not be focused on important variables; they will usually talk with the people they have been observing, they may or may not talk about anything important. We have found that with a reasonable amount of structure these people can be gathering data of broader significance while engaging in more valuable observations and dialogues. This guideline leads toward meaningful data-gathering tasks (essentially describing and asking) rather than non-meaningful tasks (such as tallying or sorting).

A discussion of what we have learned would be incomplete without a word about the inadequacies we have noted in our work. It was our

hope that the Focused Observation technique would provide a way to investigate a wide range of instructional variables with a minimum of predisposition to exclude any potentially important variable. The focus on decision-making moments has provided a very workable "handle" to get hold of the dynamic variables. We can build highly meaningful pictures of teaching in any kind of setting and in an efficient manner. Analyses of these data do get behind the overt acts into the minds of teachers. Comparisons of sets of described behaviors do put the finger on certain kinds of differences in various settings.

The derived materials have been found to be useful in preclinical teacher education courses and for the development of simulator sequences. Yet we are not getting at everything—far from it. Our derived models are like vignettes. The connective tissue is weak. The threads that tie instructional moments into instructional sequences still elude us. It is as if we have the concrete blocks which build the wall, but we cannot find the mortar. We are opening new investigative avenues, building new observational techniques on the guidelines already cited, hoping to delineate more adequately patterns, sequences and "moves" in the instructional task. To develop our approaches, we are incorporating ideas from the work of others whose approaches to research on teaching have been different.

In summary, teaching is an art, yet it need not be purely intuitive. Learning is affected by philosophical, physiological, psychological and sociological factors; and since these can be studied through orderly processes, it follows that scientific inquiry can help us toward an orderly comprehension of learning and teaching.

Kepes (6) inspires us to seek models that will re-form a formless world: creative vision flows from a balance of the two crucial values—expressive vitality and formal order. Formal order requires theory; the least inhibiting sort of theory is theory which assists in comprehension of the essence of the art. A creativity without theory is purely intuitive and cannot be taught.

In the study of teaching, we must build behavioral theory. Practitioner description must account for activity more than for static traits, more for *doing* than for being. The clinical research we have been describing is leading into such theory building. At this time, six rudimentary statements comprise the assumptions in the behavioral theory of teaching which is emerging. These statements can be seen as extensions of previous assumptions in educational theory, as in Ryans (10), who implies that (a) teacher behavior is a function of situational factors, and (b) teacher behavior is observable.

1. (a) Teaching is a process in which one person's behavior affects another's behavior in such a way as to induce change.

(b) Teaching is a generalized set of behaviors which can be examined and explained in terms of a general theory of human behavior.

2. Teacher behavior is the singular mode of expressing the composite of beliefs, knowledge, attitudes, perceptions and aspirations which constitute teaching in any given situation.

3. Teacher behavior can be viewed as being comprised of (a) rational acts and (b) nonrational acts.

4. (a) The rational acts of teaching can be identified as having origin in rational decision-making processes.

(b) The nonrational acts of teaching can be identified in terms of their lack of basis in rational decision-making processes.

5. Teaching behavior can be described as a set of acts made as more or less rational responses to environmental (situational) factors.

6. Meaningful descriptions of teaching behavior relate environmental factors, teaching acts, and behavioral outcomes.

Such theory should provide a framework that is useful in numerous contexts. As Hilgard (5) states: "Theories serve more than one purpose: they attempt to organize existing knowledge, they attempt to provide threads or hypotheses toward new knowledge, and they may also furnish principles by which what is known can be used."⁹ We can observe the power of the behavioral theory of teaching by examining the empirical evidence obtained from the clinical research, the questions it answers, the purposes it serves, and the new questions it raises.

Behavioral theory can help us see ways to integrate our enterprise into a set of communicating components, professionally bound together in mutual dependencies. Clearly, the science of human behavior undergirds the practitioner arts in education. Art and science must be reconciled—expressive vitality and formal order must be balanced. Kepes (6) summarizes the hope and implies a challenge:

Only complete acceptance of the world which is being born can make our lives genuinely acceptable. Such acceptance implies, above all, two concrete tasks. One, in every field of human endeavor we must advance to the furthest frontiers of knowledge possible today. Two, we must combine and intercommunicate all such knowledge so that we may gain the sense of *structure*, the power to *see*, in the deepest, richest sense, our world as an interconnected whole.¹⁰

⁹ Hilgard, *op. cit.*, p. 485.

¹⁰ Kepes, *op. cit.*

Response to this challenge can lead to an integrated and dynamic profession.

References

1. I. Bross. *Design for Decision*. New York: Macmillan Company, 1953.
2. A. P. Coladarci and J. W. Getzels. *The Use of Theory in Educational Administration*. Stanford: Stanford University Press, 1955.
3. S. M. Cory. *Action Research To Improve School Practices*. New York: Teachers College, Columbia University, 1953.
4. N. Flanders. *Teachers Influence, Pupil Attitudes and Achievement*. Comparative Research Project No. 397, Minneapolis: University of Minnesota, 1960.
5. E. R. Hilgard. *Theories of Learning*, Second edition. New York: Appleton-Century-Crofts, Inc., 1956. p. 485-90.
6. G. Kepes. "Where Is Science Taking Us?" *Saturday Review*, March 5, 1966.
7. K. Lewin. *Resolving Social Conflicts*. New York: Harper & Brothers, 1948.
8. Elizabeth Steiner Maccia. "The Conceptions of Model in Educational Theorizing." *Occasional Paper 62-114 Cooperative Research Project 1632*, U. S. Department of Health, Education, and Welfare. Columbus, Ohio: Ohio State University Research Foundation, 1963.
9. D. G. Ryans. "Teacher Behavior Theory and Research: Implications for Teacher Education." *Journal of Teacher Education* 14:274-93; September 1963.
10. D. G. Ryans. *Characteristics of Teachers*. Washington, D.C.: American Council on Education, 1960.